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Recall of tobacco pack health warnings by the population in Ukraine and its association with the perceived tobacco health hazard

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Abstract

Objectives

After years of prevalence of smoking increase, Ukraine observes its decline. Recent tobacco control measures included smoke-free policies, new textual health warnings (THW) since late 2006, ban of outdoor tobacco advertising since January 2009 and tobacco tax increase since late 2008. The objective was to estimate potential contribution of THW to smoking decline process in Ukraine.

Methods

The study is based on a nationwide omnibus survey of 2008 Ukrainian adults (18+). Outcome measures: quitting smoking after 2006 and perception of tobacco-related

hazards. To measure the exposure to THW respondents were asked to describe the warnings they recall. Multivariate regression analysis was performed in SPSS 15.0.

Results

Those who considered health hazard of smoking as serious were significantly more likely to quit. Male smokers were more likely to perceive health hazard if they recalled health warnings 'Smoking is addictive, do not start to smoke!' and 'Smokers die early'.

Conclusions

THW reach those groups of the population they are aimed to and may potentially result in consequent quitting smoking in male smokers.

Key words: tobacco smoking; smoking cessation; tobacco control; cigarette packages health warnings.

Text

Introduction

The Framework Convention on Tobacco Control (FCTC) recommends evidence-based measures to reduce tobacco use. However, their practical implementation in countries with high smoking prevalence can benefit from particular information on how every single measure reaches different socio-demographic groups, and what can be done to increase the effect.

Before Ukraine enacted the first tobacco control law in late 2005 and ratified the FCTC in 2006, prevalence of smoking was increasing. The age-standardised prevalence of current smoking in Ukrainian men was 54.8% in 2001, and 66.8% in 2005. In Ukrainian women, prevalence increased from 11.5% in 2001 to 20.0% in 2005. (Andreeva and Krasovsky 2007) However, after the abovementioned legislative acts Ukraine observes decline in smoking prevalence. Between June 2005 and May 2009 prevalence of daily smoking among adults changed from 37% to 27%, in men from 62% to 49%, in women from 17% to 9%, as was seen in several nationwide omnibus surveys (Krasovsky et al. 2009; Andreeva et al. 2009) and recently confirmed by the Global Adult Tobacco Survey data.(Ukraine Global Adult Tobacco Survey report 2010) The smoking prevalence decline is seen in most socio-demographic groups, and in all regions. The decline in women was already significant in 2006 compared to 2005, while in men only slight decline was revealed in 2007, which makes us hypothesize that smoking men and women responded differently to the undertaken measures. Since 2005, several tobacco control policies which could contribute to the decline of smoking prevalence were implemented in Ukraine. Smoke-free policies (Goodman et al. 2009) supported by

media campaign since the middle of 2006 covered many workplaces and public places. At least 50% of the area of restaurants and bars had to be isolated from the smoking area so that the tobacco smoke does not penetrate to the smoke-free areas. New textual health warnings labels (NTHWL) covering 30% of the surface of two larger sides of cigarette packs (one main warning on the front side related to cancer and cardiovascular diseases and one of six additional warnings on the back side related to impotence, addiction, smoking in pregnancy, second-hand smoke impact in kids and adults, and premature deaths of smokers) since late 2006 substituted a warning born by all packs and covering just 10% of the front surface 'Ministry of Health warns: smoking is bad for your health' without specific requirements regarding the colours of the text warning. Smoking cessation services implemented in some territories of Ukraine could also contribute a bit. Ban of outdoor tobacco advertising since January 2009 could also somewhat influence at later stages of smoking prevalence decline under consideration along with tobacco tax increase since late 2008 which accounted for 50% price increase by the time of the survey compared to one year earlier.

While it is well-known that all the tobacco control measures potentiate each other, still it could be helpful in achieving ultimate results to assess how different demographic groups react to particular tobacco control measures.

The aim of this study is to estimate whether there was a significant contribution of NTHWL introduced since late 2006 in the decline of smoking prevalence among the Ukrainian population, and if there was, which particular groups responded most. FCTC Article 11 requires each Party to adopt and implement, within a period of three years after entry into force of the FCTC for that Party, effective measures to ensure that tobacco product packaging and labelling carry large, rotating health warnings (which

must describe the harmful effects of tobacco use, and may include other appropriate messages) that should cover at least 50% – and must cover at least 30% – on the principal display areas (usually the front and back of the pack) (Article 11.1(b)).

Health warnings on tobacco product packages are known to be effective in increasing the perception of health risk, supporting the intention to quit tobacco use, discouraging the intention to begin tobacco use, and increasing cessation rates (CDC 2009; Hammond et al. 2003). Health warnings make cigarette packs less attractive, distract the attention from the particular brand and increase the perceived risk of dying from smoking-related illness, especially to smokers who already intended to stop smoking (Willemsen 2005; Miller et al. 2009). Still, not all the cigarette package warning labels are effective in building awareness regarding tobacco health impact. For example, the health warnings in the USA were claimed to be ineffective (Krugman et al. 1999; Givel 2007), or less effective than could be (Nimbarte et al. 2005).

Most of the studies which show positive effects of health warnings were considering graphic or pictorial ones (Borland et al. 2009a; Etter and Cornuz 2009; Hammond et al. 2004a; Hammond et al. 2003; Hammond et al. 2004b; Thrasher et al. 2006; Thrasher et al. 2007a; Thrasher et al. 2007b; White et al. 2008). With regard to textual health warnings, tobacco consumption decline was linked to the introduction of such warnings in Turkey, South Africa, Poland and Canada (Curbing the epidemic: Governments and the economics of tobacco control 1999); however, detailed studies related to textual health warnings were less numerous, and were conducted in Australia (Borland 1997) and the European Union (Willemsen 2005). It was also shown that the graphic warnings may be superior to text-based warnings as pictorial health warnings stimulated more cognitive responses (Borland et al. 2009a; CDC 2009; Hammond et al. 2007; Hammond

et al. 2006; O'Hegarty et al. 2006; O'Hegarty et al. 2007; Peters et al. 2007) with most of these studies comparing either Canadian graphic warnings to US textual ones or Australian warnings to the UK text-only warnings. In one study (Hassan et al. 2008) textual health warnings in the UK and the US were compared showing that more prominent textual warnings implemented by the European Union resulted in more contemplation of quitting in smokers. As all these studies were conducted in Western, high-income countries, there is little evidence for such an impact in other countries. This paper addresses an important research question of the consistency of textual warnings effects across cultural, political and socio-demographic settings.

We aimed to measure how much the health warnings introduced in Ukraine are seen by the population, and whether recall of health warnings is associated with tobacco health impact awareness or intention and attempts to stop smoking. We hypothesized that certain socio-demographic groups are better reached by health warnings than the others, that remembering particular or all health warnings is associated with perception of higher tobacco-related harm, and that such perception is associated with attempts to stop smoking.

Methods

The study is based on a nationwide omnibus survey of 2008 randomly selected Ukrainian adults (18+) between May 21 and May 31, 2009, conducted by the Kyiv International Institute of Sociology (KIIS). Interviews were conducted in person in Ukrainian or Russian according to respondents' preference. KIIS omnibus surveys are nationwide regular surveys of adult population of Ukraine aged 18 years and over with

four-stage sampling scheme and random sampling at each stage. The survey was conducted in 110 settlements of all 26 administrative territories of Ukraine based on the electoral lists. The sample accurately reflected the demographic and geographic profile of the country. The margin of error for the sample of 2000 respondents is +/- 2.2% at the 95% level of confidence.

As an ultimate outcome measure we considered quitting smoking in particular years, and the perception of tobacco-related hazards was considered as an intermediary outcome.

Smoking status was measured according to the WHO 'Monitoring the tobacco epidemic' 1998 publication (WHO 1998) with identifying seven categories of smoking status: daily smokers, occasional smokers, reducers, former daily smokers, former occasional smokers, experimenters, never smokers. For particular purposes, seven groups of smoking status were collapsed into three – current smokers (daily, occasional and reducers), former smokers (former daily and former occasional smokers) and non-smokers (experimenters and never smokers).

To assess the impact of particular measures, ex-smokers were asked about the year when they quit for distinguishing those who quit smoking after the introduction of health warnings in late 2006. For these purposes, in a nested case-control design those who reported to quit smoking in 2007, 2008 and 2009 were considered cases and those who were still current smokers in May 2009 were considered controls.

Perception of tobacco-related hazards was measured with a question 'Now, thinking about the possible health effects of smoking cigarettes, in general, do you think that smoking cigarettes is a serious health hazard, a moderate health hazard, a minor health hazard, or not really a health hazard at all?' As the options b-e (b. Moderate health

hazard, c. Minor health hazard, d. Not a health hazard at all, e. Don't know/undecided) were less numerous than the first answer to this question (a. Serious health hazard) and were rather homogeneous in terms of their association with the intent and the attempts to quit, the options b-e were collapsed into one alternative.

To measure the respondent's attention to health warnings, study participants were asked to describe the warnings they recall. Interviewers were instructed not to show the texts to the respondents and not to expect the exact wording of the warning, but to mark the particular warning as 'recalled' given the respondent mentions the corresponding topic (for instance 'impotence', 'heart disease', 'pregnancy' etc.). Number of the warnings that were recalled was also used as a measure of the respondent's attention to health warnings with minimum number of health warnings recalled equal to 0, and maximum equal to 7.

To control for the potential impact of socio-demographic factors, information on gender, age, and education was collected as well. Education was described as one of four options: incomplete secondary or less, complete secondary, vocational secondary, and complete higher.

Regression of the number of recalled health warnings on socio-demographic variables was analysed with the use of the General Linear Model option within SPSS 15.0. Main effects and interaction of separate categorical variables were analysed.

For identifying the factors related to the recall of separate warnings, multivariate binary logistic regression analysis was performed separately for current smokers, former smokers and non-smokers.

Associations of recent quitting smoking and perception of tobacco health hazard with other categorical variables were analyzed with the use of multivariate binary logistic regression analysis as well.

Results

Percentage distribution of the study sample is shown in Table 1. Females constituted 59% of the sample, 54% were never smokers and 25% were daily smokers.

Who notices and recalls health warnings? Sum of warnings

In all demographic groups, minimum number of NTHW recalled was 0, and maximum equalled 7, while the average was 2,24. Multivariate comparison of means between different groups of respondents with the use of General linear model is shown in Table 2.

Smokers on average recalled more warning labels than non-smokers. More educated people recalled more health warnings than those with lower education. However, an interaction with gender was found – in men those less educated (who are more likely to smoke) recalled more NTHWL.

Recall declined with age from 3.05 in 25-34 years old group to 1.48 in those aged over 55. However, the decline by age was only typical for non-smokers and former smokers, while the decline was smaller in current smokers.

Particular warnings

Besides the number of NTHWL recalled, probability of remembering every particular health warning was analyzed as well. Percentages of respondents who recalled the

warnings are shown in Table 3, and this was done for the whole sample as well as for current smokers, former smokers, and non-smokers separately.

Those warnings which are placed on the front side of the every pack ('Smoking causes cardiovascular diseases and lung cancer') were recalled most frequently – by 70% of respondents. Among other six warnings two warnings were recalled by about one third of respondents ('Smokers die early' and 'Tobacco smoke harms the health of those around you'), two other health warnings were recalled by one in four respondents ('Smoking when pregnant harms your baby' and 'Smoking causes impotence') and two warnings by less than one in five respondents ('Protect children: do not make them inhale your smoke' and 'Smoking is addictive, do not start to smoke!')

Smokers were more likely to recall every warning than former smokers and non-smokers. Higher odds for smokers to recall a health warning compared to non-smokers were more prominent (OR 3,37 (95% CI 2,56-4,42)) for the front-side warning and the weakest for the warnings related to passive smoking ('Protect children: do not make them inhale your smoke' – OR 1,23 (95% CI 0,96-1,57), and 'Tobacco smoke harms the health of those around you' – OR 1,35 (95% CI 1,09-1,67)).

While some health warnings were equally recalled by males and females, warning related to consequences of smoking in pregnancy was more likely to be recalled by women-smokers than men-smokers OR=1,35(1,06-1,72), and other three warnings ('Smoking is addictive, do not start to smoke!', 'Smoking causes impotence', and 'Smokers die early') were recalled by larger proportion of men than women who do not smoke.

In all smoking status groups, younger respondents recalled health warnings more likely than those older ones. However, there is no such association in current smokers with

regard to harm of SHS, thus older smokers are more likely to pay attention to the information related to SHS than the younger ones.

Association between recall of health warnings and education is seen only in non-smokers. Thus smokers with different education are equally reached by the information in health warnings.

Association between health warnings-recall, tobacco harm perception, and quitting smoking

Only 38 respondents said they quit smoking since the beginning of 2007. They were compared to those 630 who were still current smokers by May 2009. No significant association with remembering particular health warnings was found. However, among those who considered tobacco-related health hazard as serious 31 (7.0%) quit smoking in 2007-2009, while among the others only 7 (2.5%) with OR= 3,362 (95%CI 1,458-7,750). The association was significant only for male smokers.

Associations of particular warnings recall with perception of health hazard of smoking were explored in men stratified by smoking status and results of bivariate analysis are presented in Table 4. Smokers were more likely to perceive health hazard of tobacco use as serious if they recalled health warnings 'Smoking when pregnant harms your baby', 'Smoking is addictive, do not start to smoke!', 'Protect children: do not make them breathe your smoke', and 'Smokers die early'. In multivariate analysis recalling NTHWL related to addictiveness of cigarettes and early deaths of smokers were independently associated with the perception of tobacco health hazard. None of the health warnings were associated with higher perception of tobacco-related harm in former smokers, and

recalling the warning ‘Smokers die early’ was associated with higher perception of harm in non-smokers.

Discussion

The study assessed how the textual messages introduced in Ukraine in line with the FCTC requirements are seen by the population and whether noticing these messages was associated with higher awareness of tobacco-related harm.

As front-side health warnings are being exhibited at the points of sales and in advertising we could expect them to be seen and recalled more than other health warnings by both smokers and non-smokers. However, this warning ('Smoking causes cardiovascular diseases and lung cancer') is definitely aimed at smokers, and we found its recall to be stronger associated with the smoking status than the recall of other warnings. On the other hand, passive smoking-related warnings are more evenly recalled by both smokers and non-smokers. This means that the intended groups are reached by those warning labels. Besides, warnings related to pregnancy are more likely recalled by women, while warnings about impotence are more recalled by men. This gives information about the selective attention of different segments of the population to those NTHWL which were aimed at them. Thus, we conclude that by means of measuring the recall of health warnings we get information not just about presence but about the potential impact of health warnings.

High recall of health warnings among young non-smokers which was almost equal to the recall of daily smokers could reflect the attention of young people to tobacco packs health warnings and their potential role in preventing smoking initiation among the

youth. Some studies suggest that health warnings may have the potential to lower smoking intentions of adolescents (White et al. 2008). Large portion of recent smoking prevalence decrease was probably due to lower initiation; however, the role of NTHWL in this requires additional research.

Males were found to react more to health warnings than females. For male-smokers it was found that recalling several warnings was associated with higher perceived health hazard related to tobacco, which could be a trigger towards quitting smoking. No association found in female smokers could be partly due to their smaller number in the sample.

Indirect evidence which contributes to the understanding that health warnings in Ukraine worked more for quitting smoking in male smokers is the following fact. Some slight decline in smoking prevalence in males started to be seen only in 2007 compared to 2006, while significant decline of prevalence in females was already found in 2006 compared to 2005 (Andreeva et al. 2009). This suggests that female smokers responded more to the smoke-free policies-related information campaign, while male smokers reacted more after the introduction of new health warnings. Thus, we see that some of the health warnings could contribute to higher awareness of tobacco-related harm in male smokers and possibly to their quitting attempts. While studies of the effectiveness of health warnings are not numerous, International Tobacco Control Policy Evaluation Study (ITC) has shown that noticing health warnings was associated with higher knowledge about tobacco risks among smokers (Hammond et al. 2006). Though the direct association between NTHWL recall and quit attempts was not found in our study, the results suggest that an indirect link may be present. On the one hand we revealed a link between recall of health warnings and perception of tobacco related hazard. On the

other hand, this perception was associated with quitting. Obviously, noticing a warning does not lead to immediate quitting; however, it may predict downstream quit attempts. Other studies have shown the so-called ‘prospective predictors of making quit attempts’ (Borland et al. 2009a; Borland et al. 2009b).

Our study found which exactly health warnings were associated with perception of health hazard in male smokers. These were warnings regarding addiction ('Smoking is addictive, do not start to smoke!') and premature death ('Smokers die early') as well as two warnings related to the harm to children through second-hand smoke exposure and smoking in pregnancy. Probably this was exactly the truth which was not obvious to smokers earlier. This is likely to illustrate the idea that the goal of health warnings is the continuous dissemination of the latest scientific findings on the health consequences of smoking (Potschke-Langer and Schulze 2005). The effects of the health warning regarding addiction are expected based on what is known from the international experience. In Australia tobacco industry paid special efforts to counteract the introduction of this specific health warning (Chapman and Carter 2003). However linking higher awareness to exclusively health warnings has its limitations, as simultaneously there were other information efforts to educate the smokers.

In our study we assessed effects of textual black and white health warnings, not graphic ones mostly evaluated in recent studies related to health warnings effectiveness. Though textual warnings are known to be less effective than the pictorials, Borland R. has shown effects of textual warnings introduced in Australia in 1995 as a means of stimulating thoughts about negative consequences of smoking, refraining from smoking a planned cigarette, and making a quit attempt (Borland 1997). In 1998, textual 30% health warnings were introduced in Poland resulting in 14% of smoking men and 16%

of smoking women attempting to cut down smoking, and 3% of men and 4% of women said they had stopped smoking under the influence of such warnings (WHO 2009). Comparison of the effects of textual health warnings in the UK and the USA (Hassan et al. 2008) has shown that more prominent textual health warnings introduced by the European Union were more likely to lead to contemplation of quitting in smokers. Similar type of warnings was under our consideration.

Whether health warnings implemented in Ukraine in 2007 will have long-lasting effect is not known. Studies conducted in the ITC Policy Evaluation Project countries have shown that changes in health warnings are associated with effects (Hammond et al. 2007), which can probably decrease further.

On average, health warnings were found to be more likely recalled by younger and more educated people. This may be due to the fact that younger people have better memory and people with more formal education had opportunity to train their intellectual functions more than those who did not graduate colleges and universities. However, this difference is more expressed in non-smokers, which means that tobacco packs health warnings reach those who would be difficult to educate with other health promotion measures.

The strength of the study was that the participants were asked to recall particular health warnings which gave the information not found in other studies in the area known to the authors.

The study bears all the limitations of the cross-sectional design. Most of the favourable consequences of health warnings cited above were found in follow-up studies. In our survey a reverse order of events (‘Have you quit in 2007?’-‘Do you recall health warnings in 2009?’) poses even more limitations. Expectably, those who still smoke

recalled more health warnings than those who successfully quit a year or two ago, which does not allow establishing the association.

While the whole sample was nationally representative, subsample of smokers and especially female smokers could be insufficient for drawing conclusions with enough statistical power.

Measuring recall of health warnings could vary between interviewers. This could be a substantial cause of uncertainty in our study. Besides, some of the questions typically asked in the surveys related to health warnings effects like about postponing a planned cigarette were not asked in the survey due to logistics reasons.

With all the limitations listed above as well as the absence of the comparison group and the pre-policy assessment, the study does not give grounds for establishing causal relationship between NTHW and smoking prevalence decline, but just suggests hypotheses for further consideration.

Most of the limitations of this study could be overcome in a cohort study aimed to document responses of smokers to different tobacco control measures. However, limited resources make researchers in low and middle income countries rely on cheaper study designs.

Conclusions

1. More prominent multiple textual health warnings introduced in Ukraine since late 2006 have likely contributed to building tobacco-and-health awareness among Ukrainian population.
2. Noticing and recall of health warnings reflects their potential impact on the population awareness and behaviour: passive smoking related warnings reach non-smokers as well, pregnancy-related warnings reach women more than men, impotence-related warnings reach more men than women, etc.

3. Health warnings-remembering was stronger associated with the perception of health hazard of tobacco use among male smokers than females, and could potentially result in consequent quitting smoking.
4. Several warnings could be considered as more effective with regard to making male smokers think about quitting: 'Smoking when pregnant harms your baby', 'Smoking is addictive, do not start to smoke!', 'Protect children: do not make them breathe your smoke', and 'Smokers die early'.
5. Health warnings could contribute to the deterring young people from starting smoking or to stopping in the experimentation phase before daily smoking is established.

Recommendations

The study shows potential contribution of cigarette packages health warnings in prevention smoking initiation and promoting smoking cessation. Though with these health warnings Ukraine meets the requirements of the FCTC, experience of other countries show that cigarette packages whose warning labels contain prominent graphic imagery are more likely than text-only warning labels to promote smoking-related knowledge and smoking cessation (Thrasher et al. 2007a). International experience shows that the dissemination of Quitline phone numbers in combination with health warnings on every packet clearly improves the effectiveness and broad reach of smoking cessation advice via Quitlines (Potschke-Langer and Schulze 2005).

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Conflict of interest

The authors declare that they have no competing interests.

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Tables

Table 1 - Percentage distribution of the study sample by gender, age, education and smoking status – Ukraine omnibus survey on tobacco packs health warnings, 2009

Characteristics	Values	N	%*
Gender	Male	861	40,8
	Female	1251	59,2
Age	18-24 years	193	9,1
	25-34 years	326	15,4
	35-44 years	371	17,6
	45-54 years	438	20,7
	55+ years	784	37,1
Education	Incomplete secondary (and less)	296	14,0
	Complete secondary	752	35,6
	Vocational secondary	585	27,7
	Complete higher	479	22,7
Smoking status	Daily smokers	533	25,2
	Occasional smokers	58	2,7
	Reducers	24	1,1
	Former daily smokers	195	9,2
	Former occasional smokers	36	1,7
	Experimenters	119	5,6
	Never smokers	1147	54,3

*Weighted data

Table 2 - Number of health warnings recalled by respondent. Results of multivariate analysis performed with the use of General linear model – Ukraine omnibus survey on tobacco packs health warnings, 2009

Characteristics	Values of the first variable	Values of the second variable	B	95% Confidence Interval		Sig.	t
				Lower Bound	Upper Bound		
Intercept			2,433	2,106	2,760	0,000	14,590
Smoking status	Current smokers		1,061	0,639	1,484	0,000	4,932
	Former smokers		-0,222	-0,657	0,213	0,318	-1,000
	Non-smokers		0,000	ref group	.	.	.
Age	18-24 years		1,322	0,938	1,705	0,000	6,758
	25-34 years		1,216	0,879	1,552	0,000	7,090
	35-44 years		0,928	0,607	1,249	0,000	5,668
	45-54 years		0,738	0,424	1,051	0,000	4,611
	55+ years		0,000	ref group	.	.	.
Smoking status x Age	Current smokers	18-24 years	-0,619	-1,250	0,011	0,054	-1,927
		25-34 years	-0,323	-0,890	0,243	0,264	-1,118
		35-44 years	-0,491	-1,033	0,051	0,076	-1,775
		45-54 years	-0,926	-1,471	-0,382	0,001	-3,336

				ref			
		55+ years	0,000	group	.	.	.
	Former smokers	18-24 years	0,504	-0,617	1,624	0,378	0,881
		25-34 years	0,453	-0,306	1,212	0,242	1,171
		35-44 years	-0,576	-1,343	0,190	0,140	-1,475
		45-54 years	-0,079	-0,739	0,582	0,816	-0,233
				ref			
		55+ years	0,000	group	.	.	.
Education	Incomplete secondary (and less)		-0,790	-1,174	-0,406	0,000	-4,037
	Complete secondary		-0,630	-0,930	-0,330	0,000	-4,118
	Vocational secondary		-0,492	-0,799	-0,185	0,002	-3,139
				ref			
	Complete higher		0,000	group	.	.	.
Gender x Education	Males	Incomplete secondary (and less)	0,661	0,182	1,141	0,007	2,705
		Complete secondary	0,314	0,020	0,608	0,036	2,094
		Vocational secondary	0,218	-0,106	0,543	0,187	1,320
		Complete higher	-0,322	-0,662	0,018	0,063	-1,858

Table 3 - Frequency of recall of particular textual health warnings and associated factors, stratified by smoking status, results of multivariate binary logistic regression analysis – Ukraine omnibus survey on tobacco packs health warnings, 2009

Health warning				'Smoking causes cardio-vascular diseases and lung cancer'		'Smoking when pregnant harms your baby'		'Tobacco smoke harms the health of those around you'		'Smoking is addictive, do not start to smoke!'		'Smoking causes impotence'		'Protect children: do not make them breathe your smoke'		'Smokers die early'	
Smoking status	variable	option	N	%*	OR (95% CI)	%*	OR (95 % CI)	%*	OR (95 % CI)	%*	OR (95% CI)	%*	OR (95 % CI)	%*	OR (95 % CI)	%*	OR (95 % CI)
	smoking status	current smokers	539	87,9	**4,59 (3,52 - 6,00)**	37,2	**1,91 (1,55 - 2,36)**	38,3	**1,55 (1,26 - 1,91)**	24,1	**1,73 (1,36 - 2,21)**	39,9	**3,10 (2,49 - 3,87)**	24,0	**1,50 (1,18 - 1,90)**	43,6	**2,02 (1,65 - 2,48)**
		former smokers	210	66,2	1,25 (0,93 - 1,69)	19,9	0,81 (0,57 - 1,14)	27,7	0,95 (0,70 - 1,31)	11,3	0,69 (0,45 - 1,07)	19,5	1,13 (0,79 - 1,61)	14,3	0,79 (0,53 - 1,18)	23,8	0,83 (0,60 - 1,15)
		non-smokers	1248	61,2	1,00	23,7	1,00	28,5	1,00	15,5	1,00	17,6	1,00	17,4	1,00	27,6	1,00
Current			539														
	Gender	Male	401	87,6	1,00	33,7	1,00	37,9	1,00	24,6	1,00	40,3	1,00	21,8	1,00	43,9	1,00
		Female	138	88,4	0,93	50,8	**1,55**	39,5	0,83	21,9	0,71	38,0	0,79	32,6	1,36	41,9	0,87

				(0,49 - 1,77)		(**1,02 - 2,36**)		(0,55 - 1,28)		(0,43 - 1,15)		(0,52 - 1,21)		(0,87 - 2,14)		(0,57 - 1,33)
5 age groups	18-24 years	80	92,4	1,00	48,6	1,00	39,0	1,00	24,8	1,00	39,0	1,00	26,7	1,00	51,4	1,00
	25-34 years	129	90,6	0,80 (0,32 - 1,97)	46,8	0,90 (0,54 - 1,51)	44,3	1,24 (0,73 - 2,08)	31,4	1,54 (0,87 - 2,74)	53,8	**1,90** (**1,13 - 3,17**)	32,7	1,25 (0,71 - 2,19)	46,5	0,84 (0,50 - 1,41)
	35-44 years	117	91,0	0,85 (0,34 - 2,17)	35,2	**0,54** (**0,32 - 0,92**)	36,8	0,90 (0,53 - 1,55)	20,8	0,89 (0,48 - 1,66)	41,0	1,18 (0,70 - 2,00)	24,1	0,85 (0,47 - 1,54)	45,8	0,77 (0,45 - 1,30)
	45-54 years	107	85,2	**0,45** (**0,18 - 1,12**)	26,1	**0,37** (**0,21 - 0,67**)	27,8	0,61 (0,34 - 1,10)	16,7	0,70 (0,35 - 1,38)	33,3	0,84 (0,48 - 1,49)	11,3	**0,35** (**0,17 - 0,74**)	33,3	**0,43** (**0,24 - 0,76**)
	55+ years	106	77,6	**0,27** (**0,11 - 0,65**)	27,1	1,11 (0,62 - 1,96)	41,1	1,11 (0,62 - 1,96)	25,2	1,12 (0,59 - 2,13)	25,2	**0,53** (**0,29 - 0,96**)	22,4	0,81 (0,42 - 1,54)	39,3	0,61 (0,34 - 1,07)
Education (4 groups)	Incomplete secondary (and less)	46	84,9	1,00	26,4	1,00	34,0	1,00	15,1	1,00	49,1	1,00	22,6	1,00	39,6	1,00
	Complete secondary	213	88,9	1,16 (0,47 - 2,85)	32,0	1,53 (0,76 - 3,10)	33,2	1,21 (0,63 - 2,32)	23,7	2,05 (0,89 - 4,68)	40,5	0,70 (0,38 - 1,32)	19,4	0,96 (0,46 - 2,00)	44,0	1,25 (0,67 - 2,35)
	Vocational secondary	152	89,2	1,19 (0,46	42,0	**2,38** (**1,16**	38,6	1,45 (0,74	21,6	1,72 (0,73	35,2	**0,53** (**0,28**	24,3	1,13 (0,53	40,9	1,25 (0,65

					-3,08)		**-4,88**)		-2,82)		-4,04)		**-1,03**)		-2,41)		-2,41)
					0,73 (0,28 -		**2,05 (0,99 -**		**2,14 (1,08 -**		**2,54 (1,08 -**		0,65 (0,33 -		1,52 (0,71 -		1,59 (0,81 -
		Complete higher	128	85,1	1,91)	44,2	**4,27**)	48,0	**4,24**)	30,6	**5,97**)	40,8	1,27)	32,0	3,25)	46,9	3,12)
Former			210														
	Gender	Male	154	62,0	1,00	33,7	1,00	24,0	1,00	11,2	1,00	15,7	1,00	10,7	1,00	22,3	1,00
					1,49 (0,63 -		1,00 (0,41 -		1,21 (0,56 -		0,53 (0,16 -		0,96 (0,40 -		1,42 (0,51 -		1,03 (0,45 -
		Female	56	80,8	3,52)	50,8	2,43)	40,4	2,64)	11,3	1,71)	30,8	2,33)	26,4	3,94)	28,8	2,35)
	5 age groups	18-24 years	11	84,6	1,00	46,2	1,00	42,9	1,00	21,4	1,00	57,1	1,00	28,6	1,00	28,6	1,00
					0,87 (0,16 -		0,80 (0,21 -		1,21 (0,34 -		1,61 (0,30 -		0,51 (0,14 -		3,30 (0,70 -		1,56 (0,38 -
		25-34 years	37	81,0	4,62)	40,5	3,07)	50,0	4,32)	19,0	8,45)	40,5	1,89)	38,1	15,52)	31,0	6,38)
					0,77 (0,14 -		**0,12 (0,02 -**		0,40 (0,10 -		0,21 (0,02 -		**0,15 (0,03 -**		0,32 (0,05 -		0,85 (0,19 -
		35-44 years	26	76,7	4,26)	9,7	**0,66**)	22,6	1,62)	3,3	2,11)	16,7	**0,66**)	9,7	2,02)	22,6	3,83)
					0,72 (0,14 -		0,27 (0,06 -		0,54 (0,15 -		0,93 (0,17 -		**0,15 (0,04 -**		0,33 (0,06 -		0,87 (0,20 -
		45-54 years	39	69,8	3,69)	16,3	1,15)	27,9	2,03)	16,7	5,06)	18,6	**0,63**)	9,3	1,93)	23,3	3,72)
					0,28 (0,06 -		**0,15 (0,04 -**		**0,28 (0,08 -**		0,39 (0,07 -		**0,05 (0,01 -**		0,24 (0,05 -		0,68 (0,17 -
		55+ years	97	53,9		12,6		17,6		6,9		6,8		6,9		20,6	

					1,34)		**0,61**)		**1,02**)		2,11)		**0,22**)		1,24)		2,73)
	Education (4 groups)	Incomplete secondary (and less)	43	60,5	1,00	16,3	1,00	23,3	1,00	2,3	1,00	11,6	1,00	9,3	1,00	20,9	1,00
		Complete secondary	62	64,8	0,91 (0,37 - 2,28)	11,1	0,43 (0,12 - 1,58)	26,4	0,99 (0,35 - 2,81)	12,5	3,64 (0,47 - 28,23)	18,1	0,89 (0,22 - 3,58)	12,7	0,87 (0,19 - 4,00)	25,0	0,93 (0,33 - 2,65)
		Vocational secondary	54	68,9	0,92 (0,35 - 2,40)	29,5	1,33 (0,42 - 4,27)	27,9	0,80 (0,27 - 2,32)	16,4	4,10 (0,54 - 31,33)	21,3	0,80 (0,20 - 3,13)	21,3	1,43 (0,33 - 6,11)	24,6	0,74 (0,25 - 2,18)
		Complete higher	51	70,9	1,20 (0,45 - 3,21)	23,6	0,88 (0,26 - 2,96)	32,1	0,99 (0,34 - 2,88)	9,1	2,17 (0,26 - 17,85)	25,0	1,11 (0,29 - 4,30)	12,7	0,39 (0,08 - 1,98)	25,5	0,68 (0,23 - 2,02)
Non-smokers			1241														
	Gender	Male	184	61,8	1,00	22,7	1,00	35,5	1,00	21,4	1,00	25,5	1,00	20,0	1,00	35,9	1,00
		Female	1057	61,0	1,16 (0,84 - 1,60)	24,0	1,31 (0,91 - 1,91)	26,9	0,76 (0,54 - 1,06)	14,2	**0,68** (**0,46** - **1,01**)	15,7	**0,62** (**0,42** - **0,90**)	16,8	0,96 (0,65 - 1,42)	25,6	**0,69** (**0,49** - **0,97**)
	5 age groups	18-24 years	102	79,2	1,00	38,8	1,00	42,5	1,00	21,5	1,00	32,2	1,00	20,0	1,00	38,0	1,00
		25-34 years	160	74,9	0,79 (0,45 - 1,39)	33,9	0,72 (0,43 - 1,19)	42,1	0,89 (0,54 - 1,45)	22,2	0,98 (0,54 - 1,77)	26,3	0,64 (0,37 - 1,11)	29,8	1,61 (0,91 - 2,84)	39,0	0,99 (0,59 - 1,64)
		35-44 years	179	68,3	**0,57**	30,0	0,64	28,3	**0,50**	17,2	0,81	23,9	0,63	21,7	1,16	30,6	0,77

				(0,33 - 0,99)		(0,39 - 1,07)		**(0,30 - 0,84)**		(0,44 - 1,49)		(0,36 - 1,08)		(0,64 - 2,09)		(0,46 - 1,29)
	45-54 years	219	68,4	**0,57 (0,33 - 0,99)**	24,1	**0,47 (0,28 - 0,80)**	29,4	**0,55 (0,33 - 0,91)**	16,0	0,76 (0,41 - 1,40)	18,2	**0,46 (0,26 - 0,80)**	19,3	0,99 (0,55 - 1,80)	31,6	0,77 (0,46 - 1,29)
	55+ years	581	46,2	**0,24 (0,14 - 0,39)**	13,8	**0,21 (0,13 - 0,35)**	19,9	**0,33 (0,21 - 0,53)**	10,7	**0,38 (0,21 - 0,69)**	8,4	**0,17 (0,10 - 0,30)**	9,8	**0,42 (0,23 - 0,75)**	18,4	**0,35 (0,21 - 0,56)**
Education (4 groups)	Incomplete secondary (and less)	202	44,0	1,00	19,9	1,00	22,9	1,00	18,2	1,00	14,3	1,00	15,3	1,00	22,9	1,00
	Complete secondary	424	61,9	**1,53 (1,03 - 2,28)**	19,6	0,69 (0,42 - 1,15)	23,8	0,86 (0,54 - 1,38)	13,9	**0,59 (0,34 - 1,01)**	12,4	**0,52 (0,29 - 0,94)**	15,5	0,77 (0,44 - 1,33)	28,6	1,16 (0,72 - 1,86)
	Vocational secondary	338	63,6	**1,68 (1,10-2,56)**	23,8	0,89 (0,53 - 1,51)	30,5	1,30 (0,80 - 2,10)	11,3	**0,47 (0,26 - 0,85)**	17,9	0,86 (0,47 - 1,55)	16,2	0,76 (0,43 - 1,36)	25,1	0,91 (0,55 - 1,52)
	Complete higher	277	68,8	**1,85 (1,17 - 2,90)**	31,3	1,08 (0,63 - 1,85)	36,8	1,45 (0,88 - 2,40)	20,7	0,89 (0,50 - 1,58)	26,8	1,17 (0,64 - 2,13)	23,3	1,13 (0,63 - 2,03)	32,7	1,22 (0,73 - 2,05)

Frequency of recall of particular textual health warnings placed on cigarette packs in Ukraine and factors associated with the probability of recall.

% who recall

* Odds ratios (95% confidence intervals) adjusted for all other factors listed in the left column are shown.

Significant associations are marked with **bold** typescript.

Table 4 - Bivariate logistic regression of perception of health hazard related to tobacco use by recall of health warnings in male current smokers – Ukraine omnibus survey on tobacco packs health warnings, 2009

		Number	%*	OR**	95,0% C.I.for OR	
					Lower	Upper
'Smoking when pregnant harms your baby'	not recalled	395	52,2%	1,000		
	recalled	233	64,8%	1,689	1,210	2,358
'Smoking is addictive, do not start to smoke!'	not recalled	477	54,7%			
	recalled	151	63,6%	1,445	0,991	2,107
'Protect children: do not make them breathe your smoke'	not recalled	477	54,5%			
	recalled	151	64,2%	1,499	1,027	2,189
'Smokers die early'	not recalled	356	51,1%			
	recalled	273	64,5%	1,735	1,255	2,397